MODELS

Compaq TruCluster™ *Server V5.1 with* Compaq Tru64™ UNIX® *V5.1*

The power of UNIX without the complexity

OVERVIEW

Compaq Tru64 UNIX

Compaq TruCluster Server and Compaq Tru64 UNIX were designed to work together to provide the power of UNIX without the complexity.

Tru64 UNIX solutions offer the performance, scalability, reliability and high availability that an enterprise expects from a UNIX operating system, without the hassles of managing a complex system. TruCluster Server introduces a paradigm shift in the industry with its unique management capability. In making clusters and a "true" single system image a simple, integral part of normal operation, Tru64 UNIX and TruCluster Server are the best UNIX in the market. (Reference DH Brown 1999-2000 Operating System Report and Cluster Functionality Report http://www.unix.digital.com/webadvisory). Tru64 UNIX delivers maximum flexibility and efficient use of resources at the best service levels.

- Scale on demand
- Manage with your existing staff
- Keep data and applications available 24x7
- Handle growth at Internet speed, securely
- Allow flexibility and adapt quickly to change
- Integrate your heterogeneous environment

BENEFITS AT A GLANCE

- Efficient use of resources: servers, storage, data, people
- Maximum flexibility: applications, heterogeneous environment, adaptability
- Facilitates explosive growth
- Provides nonstop availability, performance/scalability

TruCluster Server with Tru64 UNIX Manage more with existing staff

- Multiple systems manage as one
- Easy system administration from any system, PC or server
- Saves time and money – do operations once, instead of multiple times
- Easy to use – same management tools whether a single system or multiple systems in a cluster
- Easily manage file and print services with Advanced Server

TruCluster Server with Tru64 UNIX Facilitate explosive storage growth easier, control costs

- Optimize storage usage with shared storage configurations
- Highly available storage with alternate pathing
- Manage storage easily with cluster-wide storage
- Flexible configurations including fibre channel

COMPAQ

BENEFITS AT A GLANCE *(continued)*

TruCluster Server with Tru64 UNIX Maximum flexibility: easily scales applications

- Easy to add nodes to a cluster – takes less than 15 minutes
- Greater customer growth and performance – supports larger configurations including the new AlphaServer GS servers
- High speed, low latency with MC2 memory channel interconnect (cluster interconnect)
- Higher performance with load balancing with multiple nodes running the same applications

TruCluster Server V5.1 with Tru64 UNIX *NonStop*™ Availability

- Easily achieve high availability, 24x7
- Applications are highly available "out of the box"
- Online management capabilities
- Upgrade to new versions with rolling upgrades
- Disaster prevention with Data Replication Manager support

OPTIONAL SOFTWARE

***Legato Networker*™**

Legato NetWorker is an integrated product offering that addresses the storage management needs of the heterogeneous enterprise environment. Legato NetWorker delivers manageability, availability, and performance necessary to protect multi-platform environments with one integrated solution. NetWorker Version 6.0 single server version is bundled with the Tru64 UNIX Version 5.1 operating system, enabling backup of directly attached storage. To obtain NetWorker V6.0 full product and service, please contact *Legato* via e-mail at compaqanswers@legato.com, or visit the Legato web site at www.legato.com/compaqanswers/.

Advanced File System (AdvFS) Utilities

Advanced File System (AdvFS) is a log-based file system that provides flexibility, compatibility, availability, and high performance for file and filesets as large as almost 16 TB. Administrators can add, remove, reconfigure, tune, and back up storage without unmounting the file system or halting the operating system. AdvFS supports multi-volume file systems, which enables file-level striping to improve file transfer rates, and integrates with the Logical Storage Manager. AdvFS Utilities, which is a separately licensed software product for Tru64 UNIX (see SPD 44.52.xx) provides a graphical user interface to simplify management tasks and utilities to dynamically resize file systems, defragment files, load balance, undelete files, and clone files for hot backup.

Logical Storage Manager (LSM)

The Tru64 UNIX Logical Storage Manager (LSM) is an integrated, host-based solution to data storage management, providing concatenation, striping, mirroring, hot-sparing, and a graphical user interface that allows data storage management functions to be done online, without disrupting users or applications. Cluster LSM manages storage as a single entity in both clusters. LSM is a separately licensed software product for Tru64 UNIX. Please see SPD 51.24.xx for more information.

Advanced Server for UNIX (ASU)

Compaq Advanced Server for UNIX (ASU) provides Windows NT 4.0 networking services, such as file sharing, print sharing and security, for Tru64 UNIX. In addition to basic file and print services, ASU provides full Windows domain controller support, support for enterprise-wide trust relationships, and support for Windows NT security -- including file permissions and Windows NT local and global groups.

Additionally, you can manage users, file shares and printers using native Windows NT 4.0 administrative tools. When combined with TruCluster software, ASU provides highly available and highly scalable file shares, print shares and even Primary Domain Controller resources to your Windows clients.

For more information on ASU, visit the Compaq Advanced Server for UNIX web site at www.unix.digital.com/products/adv_server.

Oracle Parallel Server (OPS)

Oracle Parallel Server (OPS) technology is a relational database management system that capitalizes on the benefits of high availability, performance, and expandability made possible by Tru64 UNIX clusters. Oracle Parallel Server must be ordered separately through Oracle Corporation.

Informix Dynamic Server

Informix Dynamic Server with the Extended Parallel Option delivers high performance while supporting commercially available cluster systems used for data warehousing and decision support applications. Informix Dynamic Server with the Extended Parallel Option must be ordered through Informix Software, Inc.

FEATURES –TRUCLUSTER SERVER V5.1

Manage cluster as a single system

- Single system image allows you to manage multiple systems as one.
- Management is easy and can be done from anywhere.
- Cluster wide file system with shared root
- Cluster wide "single" security domain
- Event management – same management tools as single system
- Cluster wide storage and cluster wide Logical Storage Manager
- Multi-instance file/print services are managed within the single system environment with Advanced Server

Achieve high availability easily

- Common cluster address
- Expanded shared storage configurations
- Applications highly available "out of the box"
- Application availability facility simplifies application setup for high availability.
- Better availability of applications and higher performance with load balancing
- Rolling upgrades keep systems and applications available while upgrading to new versions
- Data Replication Manager support delivers disaster prevention

Seamless Scalability

- MC2 memory channel interconnect for optimal performance
- Common cluster address improves application scalability
- Just add a new system and tell the cluster it is there!
- Supports parallel databases such as Oracle OPS and Informix XPS
- Fibre Channel support
- Supported with Tru64 UNIX V5.1
- Supports AlphaServer family of systems including the new AlphaServer GS servers
- All nodes can run the same applications (i.e. web, ftp/telnet, NFS, PC, file, print, IMAP, POP, etc.).

CONFIGURATION

Software Requirements

TruCluster Server Version 5.1 requires the Tru64 UNIX Version 5.1 Operating System.

For more information on Tru64 UNIX Operating System, which is a separately licensed product, see SPD 70.70.02.

Additional Required Subsets

TruCluster Server Version 5.1 requires that additional software subsets be installed. Please see the TruCluster Server Software Installation manual for further details.

Software Configuration Requirements

- At least 128 MB of memory is required on each member system.
- Additional disks are required for clusterwide root, /usr, and /var file systems, member boot disks, and an optional quorum disk. Please see the TruCluster Server Hardware Configuration manual for full details. Free disk space required for use (permanent): 52 MB to load TruCluster Server software onto a Tru64 UNIX system disk.

These requirements refer to the disk space required on the system disk. The sizes are approximate; actual sizes may vary depending on the system environment, configuration, and software options.

ORDERING INFORMATION

TruCluster Server V5.1 licenses include:

Systems	Software License	Migration License*
AlphaServer 800, 1000A, 1200, DS10, DS20, DS20E	QL-6BRAC-AA	QL-6J1AC-AA
AlphaServer ES40	QL-6BRAE-AA	QL-6J1AE-AA
AlphaServer 2000, 2100, 2100A , 4000, 4100, GS60E	QL-6BRAG-AA	QL-6J1AG-AA
AlphaServer 8200, 8400, GS60, GS140, GS160, GS320	QL-6BRAQ-AA	QL-6J1AQ-AA

Software Documentation: QA-6BRAA-GZ

If you currently have TruCluster Available Server or TruCluster Production Server and wish to convert to TruCluster Server, QL-6J1A*-AA is the migration license to use.

Software Licensing

TruCluster Server Version 5.1 is licensed as a standard Compaq software layered product and is provided only under a license. Each system in the TruCluster environment requires separate Tru64 UNIX and TruCluster Server licenses. For more information about the Compaq licensing terms and policies, contact your local Compaq representative or reseller.

This product supports the Tru64 UNIX License Management Facility (LMF). License units for the TruCluster product are allocated on an unlimited system use basis.

For more information on the License Management Facility, please see the Tru64 UNIX Operating System Software Product Description (SPD 7070.xx) or the Tru64 UNIX operating system documentation.

Distribution Media

TruCluster Server Version 5.1, a separately licensed product is distributed on the Tru64 UNIX V5.1 Associated Products Volume 2 CD-ROM, QA-MT4AA-H8.

Software Product Services

A variety of service options are available from Compaq. For more information, contact your local Compaq service representative.

HARDWARE REQUIREMENTS

TruCluster Server Version 5.1 supports the systems listed below with up to 8 systems in a configuration.
TruCluster Server Version 5.1 supports the KZPSA-BB, KZPBA-CB, KGPSA-BC, and KGPSA-CA as shared storage bus adapters. Subject to the current maximum number of adapters and any other restrictions for a given system. TruCluster Server supports a maximum of 32 shared buses in any combination. Information on firmware release can be found at http://www.compaq.com/support/ or from the current Alpha systems firmware update CD-ROM.

Supported Systems

System	Shared Storage IO Adapter	MC
AlphaServer 800	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer 1000A	KZPSA	MC1.5
AlphaServer 1200	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer 2000	KZPSA	MC1, 1.5
AlphaServer 2100	KZPSA	MC1, 1.5
AlphaServer 2100A	KZPSA	MC1, 1.5
AlphaServer 4000, 4100	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer 8200	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer 8400	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer DS10	KZPBA, KGPSA	MC2
AlphaServer DS20, DS20E	KZPBA, KGPSA	MC2
AlphaServer ES40	KZPSA, KZPBA, KGPSA	MC2
AlphaServer GS60, GS60E	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer GS140	KZPSA, KZPBA, KGPSA	MC1, 1.5 & 2
AlphaServer GS160	KZPBA, KGPSA-CA	MC2
AlphaServer GS320	KZPBA, KGPSA-CA	MC2

Note: Hard partitions of GS160 and GS320 can be clustered together either across separate systems or within systems but each hard partition must have a memory channel connection.

HARDWARE REQUIREMENTS *(continued)*

Supported Memory Channel Hardware

TruCluster Server Version 5.1 requires Memory Channel hardware. Note that there are two variants of Memory Channel (MC):

MC 1 & 1.5	MC2	Description
CCMAA-AA or CCMAA-BA	CCMAB-AA	PCI Adapter
CCMHA-AA	CCMHB-AA	Hub
CCMLA-AA	CCMLB-AA	Line Card
N/A	BN39B-04	4-meter Cable
BC12N-10	BN39B-10	3-meter Cable
	BN39B-01 (one meter)	Connects MC adapter to CCMFB optical converter
	CCMFB-AA	Fibre Optics Converter
	BN34R-10	Fibre optics cable: Connect one optical converter to another
	BN34R-31 (31 meter)	Fiber optics cable: Connect one optical converter to another

Notes:

- At least one Memory Channel adapter must be installed in a PCI slot in each member system. A link cable(s) is required to connect systems to each other or to a hub. A cluster environment with two nodes does not require a hub. A configuration of more than two members requires a Memory Channel hub.
- MC1.5 or MC2 cannot be mixed on the same rail with MC2.

There are special rules about circumstances where Memory Channel 1 and Memory Channel 2 can be used together in the same cluster. The TruCluster Server Hardware Configuration manual provides information regarding supported Memory Channel configurations.

Supported Fibre Channel Hardware

TruCluster Server supports the following Fibre Channel hardware. For more information on the supported Fibre Channel solutions, please see the TruCluster Software Products *Release Notes* and the *Hardware Configuration* manual.

Device	Description
KGPSA-BC	PCI-to-Fibre Channel host adapter
KGPSA-CA	PCI-to-Fibre Channel host adapter
DS-DSGGA-AA/AB	8/16 port Fibre Channel switch
DS-DSGGB-AA/AB	8/16 port Fibre Channel switch
DS-DSGGC-AA	8 port FC switch
HSG60	Array Controller
HSG80	Array Controller
MA6000	RAID Array
RA8000/MA8000	RAID Array
ESA12000/EMA 12000	RAID Array

Supported SCSI Controllers

The systems are connected to shared SCSI buses using an adapter from the following list. The TruCluster Server Hardware Configuration manual and Release Notes provide more information regarding SCSI controller configuration, respectively:

- KZPSA - PCI to Fast Wide Differential SCSI-2 adapter
- KZPBA-CB - PCI to UltraSCSI wide differential adapter

Supported SCSI Signal Converters

TruCluster Server Version 5.1 supports the following SCSI signal converters. The TruCluster Server Hardware Configuration manual provides information regarding supported SCSI signal converters configuration.

Signal Converter	Description
DWZZA-AA	Standalone unit, single-ended/narrow to differential/narrow
DWZZA-VA	SBB, single-ended/narrow to differential/narrow
DWZZB-AA	Standalone unit, single-ended/wide to differential/wide
DWZZB-VW	SBB, single-ended/wide to differential/wide
DS-DWZZH-03	UltraSCSI hub
DS-DWZZH-05	UltraSCSI hub

HARDWARE REQUIREMENTS *(continued)*

Supported SCSI Cables

TruCluster Server Version 5.1 supports the following SCSI cables:

Device	Description
BN21W-0B	SCSI-2 Cable "Y"
BN21R or BN23G	SCSI-2 Cable "A"
BN21K or BN21L	SCSI-3 Cable "P"
BN21M	50-pin LD to 68-pin HD
BC06P or BC19J	50-pin LD Cable
BN38C, BN38D, or BN38E	VHDCI to HD68 cable
BN37A	Ultra VHDCI Cable
BN37B	VHDCI to HD68 cable
BN21M	50-pin LD to HD68 cable

Supported Terminators and Connectors

TruCluster Server Version 5.1 supports the following terminators and connectors:

Device	Description
H879-AA	HD68 terminator
H885-AA	HD68 tri-link connector
H8861-AA	VHDCI tri-link connector
H8863-AA	VHDCI terminator
H8574-A	50-pin LD terminator
H8860-A	50-pin LD terminator

Supported Disk Devices

Every SCSI and Fibre Channel storage disk currently sold by Compaq that appear in the supported options list for a supported AlphaServer, are supported for use in a cluster on a shared bus.

Some legacy disk devices are not supported for use on a shared bus. TruCluster Server supports the list below of disk devices on shared storage. Any SCSI or Fibre Channel storage disk manufactured by Compaq later than the ones in the following list, and appearing in the supported options list for a supported AlphaServer, are supported.

- RZ26-VA Narrow
- RZ26L-VA Narrow
- RZ26L-VW Wide
- RZ26N-VA Narrow
- RZ26N-VW Wide
- RZ28-VA Narrow
- RZ28-VW Wide
- RZ28B-VA Narrow
- RZ28D-VA Narrow
- RZ28D-VW Wide
- RZ28L-VA Narrow
- RZ28L-VW Wide
- RZ1BB-VW Wide
- RZ28M-VA Narrow
- RZ28M-VW Wide
- RZ29-VA Narrow
- RZ29-VW Wide
- RZ29B-VA Narrow
- RZ29B-VW Wide
- RZ29L-VA Narrow
- RZ29L-VW Wide
- RZ40-VA Narrow
- RZ40-VW Wide
- RZ40L-VA Narrow
- RZ40L-VW Wide

HARDWARE REQUIREMENTS *(continued)*

Supported Tape Devices and Media Changers

TruCluster Server Version 5.1 supports the configuration of specific tape devices on a shared SCSI bus and on Fibre Channel. These devices will function properly in a multi-initiator environment. On a SCSI bus, they will be disrupted by bus resets that occur during cluster membership change events. Backup software must be explicitly capable of handling and recovering from such events and must utilize the cluster application availability facility to facilitate highly available backup.

The following tape devices and media changers are supported on shared storage:

- TZ88
- TZ885 DLT Mini Library
- TZ887 DLT Mini Library
- TZ89
- TL881
- TL890 Mini Library Expansion Unit
- TL891 Mini Library
- TL892 Mini Library
- TL893 Automated Tape Library
- TL894 Automated Tape Library
- TL895 Automated Tape Library
- TL896 Automated Tape Library
- Compaq 20/40-GB DLT Tape Drive
- Compaq 40/80 GB DLT Tape Drive
- ESL9326D Enterprise Library
- 340654-001 Fibre Channel Tape Controller
- 152975-001 Fibre Channel Tape Controller II

Note: The TL881, TL890, TL891, TL892, TL893, TL894, TL895, TL896, and Compaq 20/40-GB DLT Tape Drive are supported with both the KZPSA and KZPBA-CB adapters. All other tape device and media changer support is provided with KZPSA adapters only.

Compaq 40/80 GB DLT Tape Drive and ESL9326D Enterprise Library are supported with both the KZPSA and KZPBA-CB adapters. All other SCSI attached tape device and media changer support is provided with KZPSA adapters only.

The TL891 Mini Library, TL895 Automated Tape Library and the ESL9326D Enterprise Library are also supported on a Fibre Channel storage bus with the KGPSA-BC and KGPSA-CA adapter.

The Compaq Fibre Channel Tape Controller is a Fibre Channel-to-SCSI bridge that allows a differential SCSI tape device to communicate with other devices on a Fibre Channel. Refer to Enterprise Backup Storage documentation for a list of tape devices supported on Fibre Channel tape controllers.

Supported Storage Boxes

TruCluster Server Version 5.1 supports the following storage boxes:

Storage Box	Description
BA350	Single ended, narrow
BA356	Single ended, wide
DS-BA356	Ultra SCSI, SBB shelf

Supported Parallel SCSI Array (RAID) Controllers

TruCluster Server Version 5.1 supports the following parallel SCSI RAID controllers on shared storage buses. The TruCluster Server Release Notes provide information regarding supported Array (RAID) controllers firmware revisions.

RAID Controller

SWXRA-Z1 Array Controller (HSZ20)
HSZ40-Bx Array Controller
HSZ40-Cx Array Controller
HSZ50-Ax Array Controller
HSZ70 Array Controller
HSG60 Array Controller
HSG80 Array Controller
HSZ80 Array Controller

Network Adapters

TruCluster Server Version 5.1 supports monitoring for any Ethernet, FDDI, ATM (LAN emulation mode only), or Gigabit Ethernet adapters that are supported by Tru64 UNIX Version 5.1.

HARDWARE REQUIREMENTS *(continued)*

Hardware Restrictions

The following are hardware restrictions for TruCluster Server Version 5.1. The TruCluster Server Hardware Configuration manual provides additional information regarding hardware restrictions.

- *Prestoserve*® NVRAM failover is not supported on shared disk devices.

Hardware Configuration Examples

The TruCluster Server Hardware Configuration manual provides hardware configuration examples. TruCluster Server V5.1 supports up to 8 member cluster configurations as follows:

- **Switched Fibre Channel**: Eight-member systems may be connected to common storage over Fibre Channel in a fabric (switch) configuration.
- **Parallel SCSI**: Only four of the member systems bay be connected to any one SCSI bus. Multiple SCSI buses may be connected to different sets of members and the sets of members may overlap. Use of a DS-DWZZH-05 UltraSCSI hub with fair arbitration enabled is recommended when connecting four member systems to a common SCSI bus.